

1-6. (Cancelled)

7. (Previously Presented) A system for producing an output sound field that is representative of an input sound field, comprising:

a microphone array for receiving the input sound field and producing therefrom a microphone signal ("P<sub>in</sub>") representative of the input sound field wherein P<sub>in</sub> comprises B-format channels, an FL (front left) channel, and an FR (front right) channel; an encoder for producing an encoded signal ("S<sub>out</sub>") from P<sub>in</sub> wherein S<sub>out</sub> comprises an ITU-compatible six channel signal; a decoder for producing a decoded signal ("P<sub>out</sub>") from S<sub>out</sub> wherein P<sub>out</sub> comprises B-format channels, an FL channel, and an FR channel; and a plurality of speakers for producing the output sound field from P<sub>out</sub>, wherein S comprises the quantities:

$s(L, FL)$	$s(L, FR)$	$s(L, W)$	$s(L, X)$	$s(L, Y)$	$s(L, Z)$
$s(R, FL)$	$s(R, FR)$	$s(R, W)$	$s(R, X)$	$s(R, Y)$	$s(R, Z)$
$s(C, FL)$	$s(C, FR)$	$s(C, W)$	$s(C, X)$	$s(C, Y)$	$s(C, Z)$
$s(SC, FL)$	$s(SC, FR)$	$s(SC, W)$	$s(SC, X)$	$s(SC, Y)$	$s(SC, Z)$
$s(SL, FL)$	$s(SL, FR)$	$s(SL, W)$	$s(SL, X)$	$s(SL, Y)$	$s(SL, Z)$
$s(SR, FL)$	$s(SR, FR)$	$s(SR, W)$	$s(SR, X)$	$s(SR, Y)$	$s(SR, Z)$

wherein:

L represents a left speaker channel for an ITU-compatible six channel signal;

R represents a right speaker channel for an ITU-compatible six channel signal;

C represents a center speaker channel for an ITU-compatible six channel signal;

SC represents a surround center speaker channel for an ITU-compatible six channel signal;

SL represents a surround left speaker channel for an ITU-compatible six channel signal;

SR represents a surround right speaker channel for an ITU-compatible six channel signal;

FL represents the front left speaker channel;

FR represents the front right speaker channel;

W represents a B-format channel;

X represents a B-format channel;

Y represents a B-format channel;

Z represents a B-format channel;

and wherein

$s(\alpha, \beta)$  represents a transformation quantity relating the respective  $\alpha$  and  $\beta$  channels.

8. (Previously Presented) The system of Claim 7 wherein S comprises the following

approximate quantities:

.850	0	0	0	0	0
0	.850	0	0	0	0
0	0	.601	.736	0	.425
0	0	.601	-.736	0	.425
0	0	.601	-.368	.638	-.425
0	0	.601	-.368	-.638	-.425

9. (Previously Presented) The system of Claim 7 wherein S comprises the following

approximate quantities:

.850	0	0	0	0	0
0	.850	0	0	0	0
0	0	.601	.736	0	-.425
0	0	.601	-.736	0	-.425
0	0	.601	-.368	.638	.425
0	0	.601	-.368	-.638	.425

10. (Previously Presented) The system of Claim 7 wherein S comprises the following

approximate quantities:

.850	0	0	0	0	0
0	.850	0	0	0	0
0	0	.601	.736	0	.425
0	0	.601	-.425	0	.736
0	0	.601	-.425	.736	0
0	0	.601	-.425	-.736	0

11. (Previously Presented) The system of Claim 7 wherein S comprises the following

approximate quantities:

.850	0	0	0	0	0
0	.850	0	0	0	0
0	0	.601	.850	0	0
0	0	.601	-.425	0	.736
0	0	.601	-.531	.638	-.184
0	0	.601	-.531	-.638	-.184

12. (Previously Presented) The system of Claim 7 wherein S comprises the following

approximate quantities:

.850	0	0	0	0	0
0	.850	0	0	0	0
0	0	.601	.425	0	-.736
0	0	.601	-.850	0	0
0	0	.601	-.106	.638	.552
0	0	.601	-.106	-.638	.552

13. (Previously Presented) The system of Claim 7 wherein S comprises the following

approximate quantities:

.850	0	0	0	0	0
0	.850	0	0	0	0
0	0	.601	.850	0	0
0	0	.601	0	0	.850
0	0	.601	-.368	.736	.213
0	0	.601	-.368	-.736	.213

14-16. (Cancelled)

17. (Previously Presented) A system for producing an output sound field that is representative of an input sound field, comprising:

a microphone array for receiving the input sound field and producing therefrom a microphone signal ("P<sub>in</sub>") representative of the input sound field wherein P<sub>in</sub> comprises B-format channels, an FL (front left) channel, and an FR (front right) channel; an encoder for producing an encoded signal ("S<sub>out</sub>") from P<sub>in</sub> wherein S<sub>out</sub> comprises an ITU-compatible six channel signal; a decoder for producing a decoded signal ("P<sub>out</sub>") from S<sub>out</sub> wherein P<sub>out</sub> comprises B-format channels, an FL channel, and an FR channel; and a plurality of speakers for producing the output sound field from P<sub>out</sub>, wherein:

a first two of said speakers are positioned so that:

azimuthally, one is approximately 8 degrees to the left of and the other is approximately 8 degrees to the right of the 12 o'clock position of a listener; and elevationally, both are positioned substantially on a horizontal plane that intersects the listener's ears; a second two of said speakers are positioned so that:

azimuthally, one is approximately 45 degrees to the left of and the other is approximately 45 degrees to the right of the 12 o'clock position of the listener; and elevationally, both are positioned substantially on said horizontal plane;

a third two of said speakers are positioned so that:

azimuthally, one is approximately 135 degrees to the left of and the other is approximately 135 degrees to the right of the 12 o'clock position of the listener; and elevationally, both are positioned substantially on said horizontal plane;

a fourth two of said speakers are positioned so that:

azimuthally, one is approximately 90 degrees to the left of and the other is approximately 90 degrees to the right of the 12 o'clock position of the listener; and elevationally, both are positioned above said horizontal plane; and a fifth two of said speakers are positioned so that:

azimuthally, one is approximately 90 degrees to the left of and the other is approximately 90 degrees to the right of the 12 o'clock position of the listener; and elevationally, both are positioned below said horizontal plane.

18. (Previously Presented) The system of Claim 17 further comprising at least two additional speakers.

19. (Previously Presented) The system of Claim 18 wherein:

sixth two of said speakers are positioned so that:

azimuthally, one is approximately 172 degrees to the left of and the other is approximately 172 degrees to the right of the 12 o'clock position of a listener; and elevationally, both are positioned substantially on a horizontal plane that intersects the listener's ears.

20. (Cancelled)

21. (Previously Presented) A system for providing an encoded signal ("S<sub>out</sub>")

representative of an input sound field, comprising:

a microphone array for receiving the input sound field and producing therefrom a microphone signal ("P<sub>in</sub>") representative of the input sound field wherein P<sub>in</sub> comprises B-format channels, an FL (front left) channel, and an FR (front right) channel; an encoder for producing S<sub>out</sub> from P<sub>in</sub> wherein S<sub>out</sub> comprises an ITU-compatible six channel signal, wherein S comprises the quantities:

$s(L, FL)$	$s(L, FR)$	$s(L, W)$	$s(L, X)$	$s(L, Y)$	$s(L, Z)$
$s(R, FL)$	$s(R, FR)$	$s(R, W)$	$s(R, X)$	$s(R, Y)$	$s(R, Z)$
$s(C, FL)$	$s(C, FR)$	$s(C, W)$	$s(C, X)$	$s(C, Y)$	$s(C, Z)$
$s(SC, FL)$	$s(SC, FR)$	$s(SC, W)$	$s(SC, X)$	$s(SC, Y)$	$s(SC, Z)$
$s(SL, FL)$	$s(SL, FR)$	$s(SL, W)$	$s(SL, X)$	$s(SL, Y)$	$s(SL, Z)$
$s(SR, FL)$	$s(SR, FR)$	$s(SR, W)$	$s(SR, X)$	$s(SR, Y)$	$s(SR, Z)$

wherein:

L represents a left speaker channel for an ITU-compatible six channel signal;

R represents a right speaker channel for an ITU-compatible six channel signal;

C represents a center speaker channel for an ITU-compatible six channel signal;

SC represents a surround center speaker channel for an ITU-compatible six channel signal;

SL represents a surround left speaker channel for an ITU-compatible six channel signal;

SR represents a surround right speaker channel for an ITU-compatible six channel signal;

FL represents the front left speaker channel;

FR represents the front right speaker channel;

W represents a B-format channel;

X represents a B-format channel;

Y represents a B-format channel;

Z represents a B-format channel;

wherein

$s(\alpha, \beta)$  represents a transformation quantity relating the respective  $\alpha$  and  $\beta$  channels,

wherein the hybrid microphone array is comprised of:

at least 6 microphones; and a baffle including a substantially ellipsoidal structure.



22. (Previously Presented) The system of Claim 21 wherein four of said microphones are arranged in a tetrahedron.

23-24. (Cancelled)

25. (Previously Presented) The system of Claim 21 wherein S comprises the following approximate quantities:

.850	0	0	0	0	0
0	.850	0	0	0	0
0	0	.601	.736	0	.425
0	0	.601	-.736	0	.425
0	0	.601	-.368	.638	-.425
0	0	.601	-.368	-.638	-.425

26. (Previously Presented) The system of Claim 21 wherein S comprises the following approximate quantities:

.850	0	0	0	0	0
0	.850	0	0	0	0
0	0	.601	.736	0	-.425
0	0	.601	-.736	0	-.425
0	0	.601	-.368	.638	.425
0	0	.601	-.368	-.638	.425

27. (Previously Presented) The system of Claim 21 wherein S comprises the following

approximate quantities:

.850	0	0	0	0	0
0	.850	0	0	0	0
0	0	.601	.736	0	.425
0	0	.601	-.425	0	.736
0	0	.601	-.425	.736	0
0	0	.601	-.425	-.736	0

28. (Previously Presented) The system of Claim 21 wherein S comprises the following

approximate quantities:

.850	0	0	0	0	0
0	.850	0	0	0	0
0	0	.601	.850	0	0
0	0	.601	-.425	0	.736
0	0	.601	-.531	.638	-.184
0	0	.601	-.531	-.638	-.184

29. (Previously Presented) The system of Claim 21 wherein S comprises the following

approximate quantities:

.850	0	0	0	0	0
0	.850	0	0	0	0
0	0	.601	.425	0	-.736
0	0	.601	-.850	0	0
0	0	.601	-.106	.638	.552
0	0	.601	-.106	-.638	.552

30. (Previously Presented) The system of Claim 21 wherein S comprises the following approximate quantities:

.850	0	0	0	0	0
0	.850	0	0	0	0
0	0	.601	.850	0	0
0	0	.601	0	0	.850
0	0	.601	-.368	.736	.213
0	0	.601	-.368	-.736	.213

31-32. (Cancelled)

33. (Previously Presented) A method for producing an output sound field that is

representative of an input sound field, comprising the steps of:

providing a microphone array for receiving the input sound field and producing

therefrom a microphone signal ("P<sub>in</sub>") representative of the input sound field

wherein P<sub>in</sub> comprises B-format channels, an FL channel, and an FR channel;

producing an encoded signal ("S<sub>out</sub>") from P<sub>in</sub> wherein S<sub>out</sub> comprises an ITU-

compatible six channel signal; producing a decoded signal ("P<sub>out</sub>") from S<sub>out</sub>

wherein P<sub>out</sub> comprises B-format channels, an FL channel, and an FR channel; and

providing a plurality of speakers for producing the output sound field from P<sub>out</sub> to

thereby represent the input sound field, wherein S comprises the quantities:

$s(L, FL)$	$s(L, FR)$	$s(L, W)$	$s(L, X)$	$s(L, Y)$	$s(L, Z)$
$s(R, FL)$	$s(R, FR)$	$s(R, W)$	$s(R, X)$	$s(R, Y)$	$s(R, Z)$
$s(C, FL)$	$s(C, FR)$	$s(C, W)$	$s(C, X)$	$s(C, Y)$	$s(C, Z)$
$s(SC, FL)$	$s(SC, FR)$	$s(SC, W)$	$s(SC, X)$	$s(SC, Y)$	$s(SC, Z)$
$s(SL, FL)$	$s(SL, FR)$	$s(SL, W)$	$s(SL, X)$	$s(SL, Y)$	$s(SL, Z)$
$s(SR, FL)$	$s(SR, FR)$	$s(SR, W)$	$s(SR, X)$	$s(SR, Y)$	$s(SR, Z)$

wherein:

L represents a left speaker channel for an ITU-compatible six channel signal;

R represents a right speaker channel for an ITU-compatible six channel signal;

C represents a center speaker channel for an ITU-compatible six channel signal;

SC represents a surround center speaker channel for an ITU-compatible six channel signal;

SL represents a surround left speaker channel for an ITU-compatible six channel signal;

SR represents a surround right speaker channel for an ITU-compatible six channel signal;

FL represents the front left speaker channel;

FR represents the front right speaker channel;

W represents a B-format channel;

X represents a B-format channel;

Y represents a B-format channel;

Z represents a B-format channel;

wherein

$s(\alpha, \beta)$  represents a transformation quantity relating the respective  $\alpha$  and  $\beta$  channels, and

wherein the hybrid microphone array is comprised of:

at least 6 microphones; and a substantially ellipsoidal baffle.

34. (Previously Presented) The method of Claim 33 wherein four of said microphones are arranged in a tetrahedron.

35. (Previously Presented) The method of Claim 34 wherein the plurality of speakers produces the output sound field from  $S_{out}$ .

36. (Previously Presented) The method of Claim 35 wherein the plurality of speakers are provided in a 2D arrangement.

37-38. (Cancelled)

39. (Previously Presented) The method of Claim 33 wherein S comprises the following

approximate quantities:

.850	0	0	0	0	0
0	.850	0	0	0	0
0	0	.601	.736	0	.425
0	0	.601	-.736	0	.425
0	0	.601	-.368	.638	-.425
0	0	.601	-.368	-.638	-.425

40. (Previously Presented) The method of Claim 33 wherein S comprises the following

approximate quantities:

.850	0	0	0	0	0
0	.850	0	0	0	0
0	0	.601	.736	0	-.425
0	0	.601	-.736	0	-.425
0	0	.601	-.368	.638	.425
0	0	.601	-.368	-.638	.425

41. (Previously Presented) The method of Claim 33 wherein S comprises the following

approximate quantities:

.850	0	0	0	0	0
0	.850	0	0	0	0
0	0	.601	.736	0	.425
0	0	.601	-.425	0	.736
0	0	.601	-.425	.736	0
0	0	.601	-.425	-.736	0

42. (Previously Presented) The method of Claim 33 wherein S comprises the following approximate quantities:

.850	0	0	0	0	0
0	.850	0	0	0	0
0	0	.601	.850	0	0
0	0	.601	-.425	0	.736
0	0	.601	-.531	.638	-.184
0	0	.601	-.531	-.638	-.184

43. (Previously Presented) The method of Claim 33 wherein S comprises the following approximate quantities:

.850	0	0	0	0	0
0	.850	0	0	0	0
0	0	.601	.425	0	-.736
0	0	.601	-.850	0	0
0	0	.601	-.106	.638	.552
0	0	.601	-.106	-.638	.552

44. (Previously Presented) The method of Claim 33 wherein S comprises the following approximate quantities:

.850	0	0	0	0	0
0	.850	0	0	0	0
0	0	.601	.850	0	0
0	0	.601	0	0	.850
0	0	.601	-.368	.736	.213
0	0	.601	-.368	-.736	.213

45-47. (Cancelled)

48. (Previously Presented) A method for producing an output sound field that is representative of an input sound field, comprising the steps of:

providing a microphone array for receiving the input sound field and producing therefrom a microphone signal ("P<sub>in</sub>") representative of the input sound field wherein P<sub>in</sub> comprises B-format channels, an FL channel, and an FR channel;

producing an encoded signal ("S<sub>out</sub>") from P<sub>in</sub> wherein S<sub>out</sub> comprises an ITU-compatible six channel signal; producing a decoded signal ("P<sub>out</sub>") from S<sub>out</sub> wherein P<sub>out</sub> comprises B-format channels, an FL channel, and an FR channel; and

providing a plurality of speakers for producing the output sound field from P<sub>out</sub> to thereby represent the input sound field wherein the hybrid microphone array is comprised of:

at least 6 microphones; and a substantially ellipsoidal baffle,

wherein:

a first two of said speakers are positioned so that:

azimuthally, one is approximately 8 degrees to the left of and the other is approximately 8 degrees to the right of the 12 o'clock position of a listener; and

elevationally, both are positioned substantially on a horizontal plane that intersects the listener's ears; a second two of said speakers are positioned so that:

azimuthally, one is approximately 45 degrees to the left of and the other is



approximately 45 degrees to the right of the 12 o'clock position of the listener; and elevationally, both are positioned substantially on said horizontal plane;

a third two of said speakers are positioned so that:

azimuthally, one is approximately 135 degrees to the left of and the other is approximately 135 degrees to the right of the 12 o'clock position of the listener; and elevationally, both are positioned substantially on said horizontal plane;

a fourth two of said speakers are positioned so that:

azimuthally, one is approximately 90 degrees to the left of and the other is approximately 90 degrees to the right of the 12 o'clock position of the listener; and elevationally, both are positioned above said horizontal plane; and

a fifth two of said speakers are positioned so that:

azimuthally, one is approximately 90 degrees to the left of and the other is approximately 90 degrees to the right of the 12 o'clock position of the listener; and elevationally, both are positioned below said horizontal plane.

49. (Previously Presented) The method of Claim 48 further comprising at least two additional speakers.

50. (Previously Presented) The method of Claim 49 wherein:

a sixth two of said speakers are positioned so that:

azimuthally, one is approximately 172 degrees to the left of and the other is

approximately 172 degrees to the right of the 12 o'clock position of a listener; and

elevationally, both are positioned substantially on a horizontal plane that intersects the listener's ears.

51. (Cancelled)

52. (Previously Presented) A method for producing an encoded signal ("S<sub>out</sub>")

representative of an input sound field, comprising the steps:

providing a microphone array for receiving the input sound field and producing

therefrom a microphone signal ("P<sub>in</sub>") representative of the input sound field

wherein P<sub>in</sub> comprises B-format channels, an FL (front left) channel, and an FR

(front right) channel; producing S<sub>out</sub> from P<sub>in</sub> wherein S<sub>out</sub> comprises an ITU-

compatible six channel signal wherein S comprises the quantities:

$s(L, FL)$	$s(L, FR)$	$s(L, W)$	$s(L, X)$	$s(L, Y)$	$s(L, Z)$
$s(R, FL)$	$s(R, FR)$	$s(R, W)$	$s(R, X)$	$s(R, Y)$	$s(R, Z)$
$s(C, FL)$	$s(C, FR)$	$s(C, W)$	$s(C, X)$	$s(C, Y)$	$s(C, Z)$
$s(SC, FL)$	$s(SC, FR)$	$s(SC, W)$	$s(SC, X)$	$s(SC, Y)$	$s(SC, Z)$
$s(SL, FL)$	$s(SL, FR)$	$s(SL, W)$	$s(SL, X)$	$s(SL, Y)$	$s(SL, Z)$
$s(SR, FL)$	$s(SR, FR)$	$s(SR, W)$	$s(SR, X)$	$s(SR, Y)$	$s(SR, Z)$

wherein:

L represents a left speaker channel for an ITU-compatible six channel signal;

R represents a right speaker channel for an ITU-compatible six channel signal;

C represents a center speaker channel for an ITU-compatible six channel signal;

SC represents a surround center speaker channel for an ITU-compatible six channel signal;

SL represents a surround left speaker channel for an ITU-compatible six channel signal;

SR represents a surround right speaker channel for an ITU-compatible six channel signal;

FL represents the front left speaker channel;

FR represents the front right speaker channel;

W represents a B-format channel;

X represents a B-format channel;

Y represents a B-format channel;

Z represents a B-format channel;

wherein

$s(\alpha, \beta)$  represents a transformation quantity relating the respective  $\alpha$  and  $\beta$  channels, and

wherein the hybrid microphone array is comprised of:

at least 6 microphones; and a substantially ellipsoidal shaped baffle.

53. (Previously Presented) The method of Claim 52 wherein four of said microphones are arranged in a tetrahedron.

54-55. (Cancelled)

56. (Previously Presented) The method of Claim 52 wherein S comprises the following approximate quantities:

.850	0	0	0	0	0
0	.850	0	0	0	0
0	0	.601	.736	0	.425
0	0	.601	-.736	0	.425
0	0	.601	-.368	.638	-.425
0	0	.601	-.368	-.638	-.425

57. (Previously Presented) The method of Claim 52 wherein S comprises the following approximate quantities:

.850	0	0	0	0	0
0	.850	0	0	0	0
0	0	.601	.736	0	-.425
0	0	.601	-.736	0	-.425
0	0	.601	-.368	.638	.425
0	0	.601	-.368	-.638	.425

58. (Previously Presented) The method of Claim 52 wherein S comprises the following approximate quantities:

.850	0	0	0	0	0
0	.850	0	0	0	0
0	0	.601	.736	0	.425
0	0	.601	-.425	0	.736
0	0	.601	-.425	.736	0
0	0	.601	-.425	-.736	0

59. (Previously Presented) The method of Claim 52 wherein S comprises the following approximate quantities:

.850	0	0	0	0	0
0	.850	0	0	0	0
0	0	.601	.850	0	0
0	0	.601	-.425	0	.736
0	0	.601	-.531	.638	-.184
0	0	.601	-.531	-.638	-.184

60. (Previously Presented) The method of Claim 52 wherein S comprises the following approximate quantities:

.850	0	0	0	0	0
0	.850	0	0	0	0
0	0	.601	.425	0	-.736
0	0	.601	-.850	0	0
0	0	.601	-.106	.638	.552
0	0	.601	-.106	-.638	.552

61. (Previously Presented) The method of Claim 52 wherein S comprises the following approximate quantities:

.850	0	0	0	0	0
0	.850	0	0	0	0
0	0	.601	.850	0	0
0	0	.601	0	0	.850
0	0	.601	-.368	.736	.213
0	0	.601	-.368	-.736	.213

62-64. (Cancelled)